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THE IMPORTANCE OF OVERT RESPONSE IN PROGRAMED INSTRUCTION AS A FUNCTION OF SCHOLASTIC APTITUDE TEST SCORES.

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AT THE INDIANA UNIVERSITY REGIONAL CAMPUS AT FORT WAYNE 171 FRESHMAN STUDIED A UNIT ON "STIMULUS AND RESPONSE" IN A MODIFIED FORM OF THE PROGRAMING STYLE CALLED "CONVERSATIONAL CHAINING," IN WHICH THE ONLY RESPONSE CONFIRMATION IS PROVIDED WITHIN THE NEXT FRAME IN THE PROGRAM. THERE WAS NO SPECIFIC EMPHASIS SUCH AS CAPITALIZATION, BUT ALWAYS AN INDIRECT RESPONSE CONFIRMATION. OF THESE SUBJECTS, 102 COMPLETED THE LESSONS IN PROGRAMED FORM, AND 69 IN NARRATIVE FORM. THE 102 STUDENTS AVERAGED 31.1 CORRECT ANSWERS, THE 69 AVERAGED 27.2. BY MATCHING ACCORDING TO SAT SCORES, 30 PAIRS OF STUDENTS WERE FOUND DIFFERING IN MEAN SAT BY LESS THAN ONE POINT. FOR THOSE WHO STUDIED THE PROGRAMED FORM, THE CORRELATION BETWEEN SAT AND TEST SCORE WAS .24, AND IT WAS .82 FOR THE OTHERS. THE ADVANTAGE OF THE PROGRAMED FORM WAS ESPECIALLY NOTABLE FOR THOSE WITH SAT VERBAL SCORES UNDER 500. EVEN THESE CLEAR-CUT RESULTS, HOWEVER, DO NOT CONFIRM THAT "LEARNING IS SUPERIOR FOR STUDENTS WITH LESS ABILITY OR POORER BACKGROUND WHEN CONSTRUCTED RESPONSES ARE REQUIRED" OR THAT "CONVERSATIONAL PROGRAMING IS SUPERIOR TO OTHER FORMS..." THE AUTHOR REMAINS CONCERNED WITH VALIDATED INSTRUCTION, RATHER THAN WITH FORMAT. IT IS INDICATED THAT, FOR SOME PROGRAM (BUT NOT FOR ALL), CONSTRUCTED RESPONSES ADD TO THEIR EFFECTIVENESS. PROGRAMED INSTRUCTION SHOULD MEAN VALIDATED INSTRUCTION, REGARDLESS OF THE FORMAT. (HH)

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Anderson's Annual Review of Psychology, 1967, chapter mentions eighteen studies concerned with the importance of overt, constructed responses by students studying programed material. Ten of these eighteen studies failed to find any superior test performance by students required to make overt responses while studying. Five additional studies since Anderson's review all failed to find superiority for overt response groups.

METHOD

Subjects. 171 freshmen among the students enrolled in T.L. Engle's general psychology classes at the Indiana University Regional Campus in Fort Wayne during the spring term 1966. Scholastic Aptitude Test scores were available for eighty-eight of these students. The mean verbal S.A.T. was 454 with a standard deviation of 110.

Instructional materials. The then current version of Barlow's learning theory program, Stimulus and Response (to be published in its final form by Harper & Row, 1968). The lessons were in a modified form of the programing style called "conversational chaining". In conversational programing the only response confirmation is provided within the context of the next frame in the program. In some programs using this style the comparison answer is capitalized in the next frame. In this form of the program there was no specific emphasis but there was always an indirect

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response confirmation. The program contained 480 frames. More than 95% of the responses to the frames by the students were considered acceptable answers according to standards set by the programer. Median time to complete the program was 5 hrs and 20 minutes.

Procedure. 102 freshmen completed the lessons in programed form and turned in their answers. 69 students studied the lessons in narrative form (the blanks filled in, item numbers removed, spaces between the items removed, and direct repetitions removed, so that the lessons became similar in appearance to any conventional written narrative).

RESULTS

. On a fifty item multiple-choice test the students who studied the lessons with blanks to be filled in averaged 31.1 correct. Those who studied the narrative form averaged 27.2 correct. The "t" ratio for the difference is 3.7 (significant at well beyond the .01 level).

S.A.T. scores were available for fifty-two of the students who studied the programed form and for thirty-six of the students who studied the narative form. By making the best possible match according to S.A.T. scores, thirty pairs of students were obtained differing in mean S.A.T. by less than one SAT point. The "t" ratio for the mean difference of 6.1 in test scores for these matched pairs was 3.3 (significant at well beyond .01).

For the students who read the narrative form the product-moment correlation between SAT and test score was .82. For

those who studied the programed form the correlation was .24. The difference between these correlations is significant at the .01 level and the correlation of .24 does not differ significantly from zero at the .05 level.

The following table indicates that the advantage for students who fill in the blanks as they study is particularly marked for students with SAT verbal scores of less than 500.

Study Method	SAT under 500	SAT over 500
A. Lessons with blanks to fill in	30.7 (n=37)	34.3 (n=15)
B. Narrative form to read	22.65 (n=22)	30.45 (n=14)
Difference (A minus B)	8.05	4.15

Table 1. Mean Score on Test as a Function of Study Method and SAT

DISCUSSION

In my opinion these rather unusually clear-cut results should not be interpreted as confirming some general prediction such as: "learning is superior for students with less ability or poorer background when constructed responses are required" or "conversational programing is superior to other forms of programing." I rule out such generalizations for several reasons, One of which is the fact that two years before this study I did a similar experiment with an earlier form of the same program (still in conversational chaining form) and found very little difference between the constructed response group and the reading group at that time.

I am more concerned with <u>validated</u> instruction than with

programed instruction. That is with technique of preparation and evidence of success than with format of final product. It seems to me that this and the previous studies collectively indicate that for some programs requirement of constructed responses significantly adds to the effectiveness of the program while with some programs it does not. The latter then, it would seem, should be published and studied in narrative form. This does not indicate any inadequacy of programing or program evaluation but the inappropriateness of limiting the designation "programed instructional material" to lessons with blanks or even to lessons with blanks that are easy to fill in correctly. Programed instruction means validated instruction, regardless of what turns out to be the format for most effective communication of a specific lesson or set of lessons.

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